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Pain, kinesiophobia, functional status, and physical activity among patients with knee osteoarthritis

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ABSTRACT

Aims: The present study attempted to investigate the relationship between pain, kinesiophobia, functionality, and physical activity among patients with knee osteoarthritis (OA).

Methods: We recruited 88 patients aged 40-70 years with OA, 21 males and 67 females, who applied to Gebze Fatih State Hospital, Department of Physical Therapy and Orthopedic Clinic between February 2022 and January 2023. We evaluated the patients' pain status with the Visual Pain Scale (VAS), their functional status with the WOMAC Osteoarthritis Index (WOMAC), their kinesiophobia with the TAMPA Scale for Kinesiophobia (TKS), and their physical activity levels with the International Physical Activity Questionnaire-Short Form (IPAQ-SF). We performed all statistical analyses using SPSS 25.0 (SPSS Inc., Chicago, IL, ABD) and p-value < 0.05 was accepted as statistically significant.

Results: The majority of the participants were females (76.1%, n=67), and the mean body mass index (BMI) was found to be 30.33. The findings revealed low positive correlations between the patients' BMI and their VAS (p=0.029) and WOMAC scores (p=0.017). While we found a moderate positive relationship between the patients' VAS and WOMAC scores (p=0.001), it was low between their TAMPA and WOMAC scores (p=0.001).

Conclusion: As a result of the study, the relationship between pain, kinesiophobia, functional status and physical activity levels of individuals with knee OA was revealed; The necessity of planning applications to increase the physical activity level of these individuals and to reduce their body mass index has been underlined.

Keywords: Osteoarthritis, physical activity, pain, functional status, kinesiophobia

This study was presented as a thesis at Kırıkkale University.

INTRODUCTION

Osteoarthritis (OA) is a long-term persisting chronic condition characterized by the deterioration of the cartilage in the joints, resulting in the bones rubbing against each other and causing stiffness, pain, and mobility impairment. This condition often affects the joints in the knees, hands, feet, and spine and is relatively prevalent in the shoulders and hip joints. Despite being primarily related to aging, OA is also associated with a variety of both modifiable and non-modifiable risk factors, including obesity, sedentary lifestyle, genetic predisposition, bone density, occupational injury, trauma, and sex.[1] In obese individuals, pain emerges most commonly in the lower extremities and weight-bearing joints, including the lower back, but may also occur in the upper extremity joints, hands and fingers, thoracic spine, and neck. Studies in cadavers have revealed that obesity is associated with higher knee OA severity compared to normal-weight individuals. In addition, the progression of OA is faster in obese individuals than in normal-weight individuals. Physical disability due to pain leads to obesity, followed by gait abnormalities and muscle weakness. In this regard, pain becomes an important factor by leading obesity-related deterioration in physical functionality and health-related quality of life.[2] Another important less-studied issue in OA is fear of movement (FOM), or kinesiophobia. It is defined as the fear of physical movement or activity resulting from the belief that it would cause pain, injury, or re-injury. The relevant research to date showed that FOM is associated with increased pain, poorer physical functionality, and greater physical and psychological disability, all of which are important paramaters for individuals with musculoskeletal disorders. In addition, FOM is associated with physical inactivity, which is particularly important for individuals with OA as activity is an essential component of their OA management.[3] Kinesiophobia due to pain is also linked with loss of functioning and physical performance in patients with knee OA. Thus, regular physical activity

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in light to moderate intensity is strictly recommended for its contribution to cardiovascular fitness and reducing the risk of diabetes and obesity. However, it is noticeable that previous research on individuals with OA rarely assessed their physical activity levels.[4]

When the literature is investigated, it is possible to come across various studies evaluating pain, functionality and balance in people with knee OA. However, there are few studies in which kinesiophobia and physical activity levels are evaluated in detail. Therefore, there is a need for studies evaluating the relationship between pain, kinesiophobia and physical activity levels.

The aim of this study is to investigate whether there is a relationship between pain, functionality, kinesiophobia and physical activity levels in individuals with knee OA.

METHODS

We carried out this study in Gebze Fatih State Hospital to explore the relationships between pain, kinesiophobia, functional status, and physical activity levels in individuals with knee OA. The Non-interventional Clinical Researches Ethics Committee of Kırıkkale University granted ethical approval to our study (Decision No: 2021.12.03, Date: 01.12.2022). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. In this regard, we recruited 88 patients aged 40-70 years with osteoarthritis, 21 males and 67 females, who applied to the Department of Physical Therapy and Orthopedics Clinic between February 2022 and January 2023. İndividuals with knee pain lasting more than 6 months, diagnosed with stage 2 or stage 3 knee osteoarthritis according to Kellgren Lawrence radiological staging in the radiological evaluation, and volunteered to participate in the study were included in this research. Nevertheless, we excluded patients having a hip or knee prosthesis, suffering any neurological disorders, having a different pathology other than gonarthrosis that could cause knee pain, having had an intraarticular knee injection for any reason in the last six months and having any cognitive and communication problems.

The G* Power program (version 3.0.10 Universität Düsseldorf, Düsseldorf, Germany) was used for the prior power analysis.[5] The effect size obtained in the reference study was found to be moderate (r=0.332). Considering that a lower level of effect size can also be obtained (r=0.3), as a result of the power analysis; It has been calculated that 80% power can be obtained at 95% confidence level when at least 82 people are included in the study. 88 people were included in our study. The effect size of the relationship between TAMPA questionnaire values and WOMAC levels obtained from these individuals was found to be moderate (r=0.355). For this effect size, it was calculated that our study reached 94% power at 95% confidence level.[6]

We administered a questionnaire to inquire about the participants' physical characteristics and demographic data. A Visual Analogue Scale (VAS) was used to assess pain. It is a ten cm-line scale ranging from 0 (no pain) to 10 (unbearable pain). In pain assessment, one is asked to mark a point on the scale according to the severity of the pain they feel. Then, the number denoted by that line is identified with the help of a ruler and noted down.[7] Besides, we utilized the TAMPA Kinesiophobia Scale (TKS) to measure the patients' fear of movement/re-injury. Published by Vlaeyen et al.[8] in 1995, it is a 17-item tool to measure fear of movement/re-injury and includes injury/re-injury and fear-avoidance parameters in work-related activities. Finally, we evaluated the patients' functional status with the WOMAC Osteoarthritis Index (WOMAC) and their physical activity levels with the International Physical Activity Questionnaire-Short Form (IPAQ-SF).

While continuous variables are presented as means, standard deviations, minimums, and maximums, categorical variables are demonstrated as numbers and percentages. Spearman's rank correlation coefficient (ρ) was calculated to reveal the associations between the variables. A ρ-value between 0.05-0.30 was accepted as a very weak or negligible correlation, between 0.30-0.40 as a low-to-moderate correlation, and between 0.40-0.60 as a moderate correlation, and between 0.60-0.70 as a robust correlation, and 0.70-1.00 as a perfect correlation.[9] We performed all statistical analyses using the Statistical Package for Social Sciences (SPSS) 22.0 (SPSS Inc., Chicago, IL, USA) program and considered a p-value < 0.05 to be statistically significant.

RESULTS

In the study, there were 88 patients, 21 males (23.9%) and 67 females (76.1%), aged between 40-70 years. While the youngest participant was 42 years old, the oldest one was 70 years old (M=57.69±7.95 years). Body mass index values were as follows: 48.9% (n=43) was found to be overweight, 27.3% (n=24) to be obese, 10.2% (n=9) to be severely obese, 4.5% (n=4) to be morbidly obese, 5.7% (n=5) to be normal, and 3.4% (n=3) to be underweight. The majority of the patients (67%, n=59) were housewives, 19.2% (n=17) were retired, 8% (n=7) were workers, and 5.7% (n=5) had a desk job.

Table 1. Patients' Demographic and Physical Characteristics

Variables	n=88	%	M±SD	Min.-Max.
Age			57.69±7.95	42-70
Employment				
Desk job	5	5.7		
Worker	7	8		
Retired	17	19.3		
Housewife	59	67		
BMI			30.33±5.2	17.58±46.88
Underweight	3	3.4		
Normal	5	5.7		
Overweight	43	48.9		
Obese	24	27.3		
Severely obese	9	10.2		
Morbidly obese	4	4.5		

SD: standard deviation, BMI: Body Mass Index, Min.: minimum, Max.: maximum, n: number of patients, %: percentage

The mean VAS score of the participants was found to be 6.25 (SD=1.4, min.=4, max.=9). The patients' BMI values varied between 17.58 and 46.88 (M=30.33, SD=5.2), while they scored between 29 and 51 on the TSK (M=43.35, SD=3.62). Their mean WOMAC score was calculated to be 40.06 (SD=16.41; min.=3, max.=75). Regarding IPAQ-SF, the lowest and highest metabolic equivalent of task (MET) were calculated to be 66 and 7413, respectively (M=836.09, SD=1127.64 (Table 2).

Table 2. Findings of Research Variables		
n=88	M±SD	Min.-Max.
VAS	6.25±1.4	4-9
BMI	30.33±5.2	17.58-46.88
TKS	43.35±3.62	29-51
WOMAC	40.06±16.41	3-75
IPAQ-SF / MET	836.09±1127.64	66-7413

n: number of patients, SD: standard deviation, Min.: minimum, Max.: maximum, VAS: Visual Analog Scale, BMI: body mass index, TSK: TAMPA Kinesiophobia Scale, WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index, IPAQ-SF: International Physical Activity Questionnaire - Short Form, MET: metabolic equivalent of task.

We discovered 60.2% of the patients (n=53) to be inactive, 34.1% (n=30) to be minimally active, and 5.7% (n=5) to be very (HEPA) active (Table 3).

Table 3. Patients' Physical Activity Levels		
Level	n	%
Inactive	53	60.2
Minimally active	30	34.1
Very (HEPA) active	5	5.7
Total	88	100

%: percentage, n: number of patients

Table 4 presents the relationships between pain, BMI, kinesiophobia, functionality, and physical activity among the participating patients.

The findings revealed a low positive correlation between the patients' VAS scores and BMI (p=0.029) but no significant relationship between their VAS and TKS scores. The patients' VAS scores had a low positive relationship with the WOMAC stiffness (p=0.026) and moderate positive associations with their WOMAC pain (p=0.001), WOMAC physical function (p=0.001), and WOMAC total scores (p=0.001). Except for WOMAC stiffness, the patients' BMI showed low positive correlations with their WOMAC pain (p=0.019) and WOMAC physical function (p=0.018), and WOMAC total scores (p=0.017). We could not conclude a significant relationship between the patients' TKS and IPAQ-SF scores. However, we discovered low-to-moderate associations between the patients' TKS scores and their WOMAC pain (p=0.001), WOMAC stiffness (p=0.003), WOMAC physical function (p=0.002), and WOMAC total scores (p=0.001) (Table 4).

DISCUSSION

In this study, we investigated the relationships between pain, kinesiophobia, functional status, and physical activity among patients with knee OA. Our findings showed that the patients' pain status had a low relationship with their BMI and a moderate link with their functional status. However, we could not find significant associations between the patients' pain and their kinesiophobia and physical activity levels. It was also the case between their kinesiophobia and functionality and physical activity levels. Similarly, there was no relationship between their functionality and physical activity levels.

The female sex is known to be one of the primary reasons for knee OA.[10] Despite little knowledge of why it is prevalent among women, it was previously claimed to be due to some factors, such as menopausal changes, changes to cartilage structure, and weaknesses in muscle strength and postural alignment in the lower extremities.[11] The prevalence of knee OA was also shown to be higher in women than in men.[12] In the study conducted by Tas et al.[13] on individuals with OA, 66 individuals were female and 14 individuals were male. Our study consisted of 88 individuals, 21 male and 67 female, and is compatible with the literature.

The incidence of symptomatic knee osteoarthritis is expressed as 13% in people over 55 years of age. In our country, knee OA due to symptoms in individuals over the age of 50; it was found to be 22.5% in female patients, 8% in males, and 14.8% in total.[12] In our study, the mean age was found to be 57.69 years, which is consistent with the literature.

Obesity and OA are two related health problems affecting the majority of the adult population.[14] It is predicted that the number of those with knee OA will increase due to the aging of the world population and the prevalence of obesity.[15] In the study by Ozcakır et al.[16] the mean BMI value of the patients with knee OA was 31.9. Similarly, in our study, the BMI values of individuals with osteoarthritis were found to be high, with an average of 30.33. In addition to negatively affecting many body systems, it is apparent that BMI is a significant risk factor for OA and needs to be controlled.

Table 4. Relationships Between Research Variables

		VAS	BMI	TSK	WOMAC			
					Pain	Stiffness	Physical Function	Total Score
VAS								
BMI		r=0.232 *p=0.029						
TSK		0.128 0.235	0.187 0.082					
WOMAC	Pain	r=0.596 **p<0.001	r=0.250 *p=0.019	r=0.363 **p=0.001				
	Stiffness	r=0.238 *p=0.026	0.175 p=0.103	r=0.313 *p=0.003	r=0.382 **p<0.001			
	Physical Function	r=0.494 **p<0.001	r=0.252 *p=0.018	r=0.322 *p=0.002	r=0.818 **p<0.001	r=.612 **p<0.001		
	Total Score	r=0.530 **p<0.001	r=0.253 *p=0.017	r=0.355 **p=0.001	r=0.875 **p<0.001	r=0.624 **p<0.001	r=0.991 **p<0.001	
IPAQ-SF/MET		0.001 0.996	0.083 0.44	0.073 0.499	-0.044 0.686	-0.168 0.118	-0.072 0.505	-0.075 0.489

Spearman's Rank-Order Correlation, *p < 0.05 **p < 0.001. SD: standard deviation. BMI: body mass index. WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index. IPAQ-SF: International Physical Activity Questionnaire - Short Form, MET: metabolic equivalent of task TSK: TAMPA Kinesiophobia Scale

In obese individuals, pain commonly appears in the lower extremities and weight-bearing joints, including the lower back. Studies in cadavers have revealed that obesity is associated with higher knee OA severity compared to normal-weight individuals. Obesity is also associated with a faster progression of OA than normal weight. Reyes et al.[14] found that the risk of developing knee OA increased by two times in the overweight and up to 4.7 times in level 2 obese individuals.

Physical disability due to pain leads to obesity, followed by gait abnormalities and muscle weakness. It is also considered a significant factor that leads to impairment in physical functioning and health-related quality of life.[2] In a study conducted by Atamaz et al.[17] regarding pain and disability in OA; obesity, advanced age, female gender, and advanced radiological stage have been shown to be important factors. In our study, we found a significant relationship between the participants' BMI values and VAS scores. In line with this result, when we consider the mechanical effects of obesity in terms of OA, we see that individuals with high BMI have to cope with more pain.

People who are afraid of pain tend to perform worse because they want to avoid pain while doing activities of daily living. In OA patients who are more inactive, reductions in muscle strength are also seen, resulting in more activity limitation.[18] Pain occurring in the case of an injury restricts movements; the person may be afraid to move even when the injured part is recovered. The higher level of pain perception, the more avoidance response is seen in the person. Kori et al.[19] defined kinesiophobia as the feeling of sensitivity and anxiety against active movement caused by a pain-resulting injury and re-injury. Many studies have shown the negative effect of fear during movement in individuals with OA.[20] In the study of Scopaz et al.[21] in which they investigated the relationship between fear, anxiety, and depression of patients with knee OA, and their physical functions, it was found that high fear avoidance was associated with a decrease in patients' functionality. Similarly, in our study, a statistically significant correlation was found with TAMPA values in all sub-parameters of WOMAC such as pain, stiffness and physical function, and in the total WOMAC score. It was observed that the functional status of individuals with high levels of fear was also negatively affected. For this reason, kinesiophobia was seen as the possible reason why individuals with knee OA approach with fear and experience functional difficulties while participating in daily life activities.

Pain is considered a leading physical and psychological barrier for individuals with OA.[22] About 80% of patients with OA have movement restrictions due to pain, 11% have difficulties in personal care, and 25% deal with problems in their activities of daily living.[23] In our study, we found a significant relationship between pain and all WOMAC parameters. Thus, it can be proposed that pain negatively affects physical functioning.

A study was conducted by Alaca examining the relationship between pain and fear of movement and clinical parameters in individuals with knee OA. As a result of this research, a moderate statistical relationship was found between pain and kinesiophobia, and it was emphasized that individuals' pain perception levels were also important in this process.[24] In another study conducted by Erden et al.[8] to investigate pain status, kinesiophobia, anxiety level and quality of life in patients with knee osteoarthritis, no relationship was found between kinesiophobia and pain. In our study, similar results were found with Erden et al. No statistically significant relationship was found between the pain states of the individuals and their fear of movement. As stated in the study by Alaca, we think that individuals' perception of pain is important in reaching this result.

In the study on the relationship between the psychological status and physical activity levels of individuals with knee OA, Uritani et al.[25] found physical activity status to be associated with kinesiophobia. In the study conducted by Güney-Deniz et al.[26] on 46 patients who had undergone knee replacement surgery, the effect of post-operative fear on the functional status of patients in the early period was examined. According to the results of the study, the range of motion, pain status and physical activities of individuals with low kinesiophobia were found to be statistically more significant than individuals with high kinesiophobia scores. In another study by Monticone et al.[27] in which 110 individuals with knee replacement surgery were included, it was shown that the kinesiophobia of individuals who regularly engaged in physical activity decreased over time. In this research, we could not find a significant relationship between the patients' kinesiophobia scores and physical activity levels, which can be attributed to the participants' sedentary lifestyles.

Rosemann et al.[28] evaluated patients with hip and knee OA with the IPAQ to determine the factors affecting physical activity. Their results showed that 55% of the cases were sedentary, 38% were minimally active, and 7% were active. Then, they stated that it is essential to increase physical activity in the conservative treatment of OA. Considering the physical activity levels of our participants, 60.2% (n=53) were inactive, 34.1% (n=30) were minimally active, and 5.7% (n=5) were rather active. Therefore, in parallel with the literature, the majority of OA patients were found to be inactive. This situation should be taken into consideration when evaluating individuals with OA, and individuals should be tried to be more active with activities which are prescribed specific to patient needs.

Voorrips questionnaire was applied by Thomas et al.[29] to examine the level of physical activity in 59 patients with knee osteoarthritis. When they compared the level of physical activity with healthy individuals, they found that it was low in all areas (such as housework, leisure time, exercise). While it was stated that this condition was associated with low functional performance, they said that it was not associated with pain. In the study conducted by Tonetelli et al.[30] on 208 individuals with knee OA, pain alone was not to be sufficient to determine the level of physical activity; and showed that although there were significant differences between the pain states of individuals, their physical activity states were to be possibly similar. In our study, no statistically significant relationship was found between physical activity scores and pain, in line with the results of Thomas et al. We think that the reason for this may be depending on many factors, especially psychological ones, that affect physical activity as well as pain. In this direction, it was seen that it was necessary to carry out studies to increase the physical activity levels of individuals.

CONCLUSION

The results of our study contributed to the literature in terms of demonstrating the relationship between pain, kinesiophobia, functionality and physical activity in individuals with knee osteoarthritis. Since studies evaluating physical activity are limited in the literature, an additional contribution has been made to the literature in this sense.

It has been observed that individuals with knee OA are overweight, and since it is known that this situation will overload the joint mechanically, we think that these individuals should be referred to dietitians for appropriate diet programs. At the same time, this process should definitely be supported with exercise programs and trainings to be organized in accordance with these individuals. Since it is seen that the pain conditions of individuals with OA negatively affect the individuals functionally, preventive measures should be taken and studies should be carried out for pain. Again, since these individuals are seen to be inactive people, it is necessary to provide trainings to increase the level of physical activity, to raise awareness of individuals and to create appropriate exercise programs.

The lack of a control group in our study and the fact that the mini mental test was not used to determine the cognitive levels of individuals more objectively were considered as limitations.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kırıkkale University Non-interventional Clinical Researches Ethics Committee (Date: 01.12.2022, Decision No: 2021.12.03).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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